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| Project Overview page 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Name of Project:** | | | Demographic Changes | | | | | | | | | | | | | | | | **Duration:** | | | 3 weeks | | | | | | |
| **Subject/Course:** | | | **Algebra 2** | | | | | | | **Teacher(s): Bond, Harris, Taormina, Green** | | | | | | | | | **Grade Level:** | | | 11 | | | | | | |
| **Other Subject Areas to Be Included:** | | | U.S. History, Ecology | | | | | | | | | | | | | | | | | | | | | | | | | |
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| **Project Idea**  Summary of the issue, challenge, investigation, scenario, or problem: | | | You are a demographic scientist hired by the US government to analyze changes the U.S. population and predict what challenges to the American culture will result from changes in the composition of our population. You will focus your research on the US population and investigate the effects of factors such as birth rate, life expectancy/mortality rates, immigration, etc. Identify an issue related to the American population whichh exhibits characteristics of change that can be modeled by an exponential function. Prepare a presentation that makes well-justified predictions using this data and shows the data in multiple representations. | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Essential Question** | | | How can I use exponential functions to model a situation in the real world?  What are the implications of the passing of the Baby Boom generation in the U.S., and what challenges will the American culture face during the next 20 years as the composition of our population changes? | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Content Standards** to be taught and assessed**:** | | | Algebra 2:  SPI 3103.1.1 Move flexibly between multiple representations (contextual, physical, written, verbal, iconic/pictorial, graphical, tabular, and symbolic) of non-linear and transcendental functions to solve problems, to model mathematical ideas, and to communicate solution strategies.  SPI 3103.1.3 Use technology tools to identify and describe patterns in data using non-linear and transcendental functions that approximate data as well as using those functions to solve contextual problems.  SPI 3103.1.4 Use mathematical language, symbols, definitions, proofs and counterexamples correctly and precisely to effectively communicate reasoning in the process of solving problems via mathematical modeling with both linear and non-linear functions.  SPI 3103.3.12 Interpret graphs that depict real-world phenomena.  SPI 3103.3.13 Solve contextual problems using quadratic, rational, radical and exponential equations, finite geometric series or systems of equations.  SPI 3103.5.3 Analyze patterns in a scatter-plot and describe relationships in both linear and non-linear data.  History:  **9.2.2** Understand how sustained growth led to an affluent society.  **9.5.2** Investigate and understand the active theaters of conflict during the Cold War  English 3:  (reading op/ed pieces on the whaling industry and preparing for a debate using a graphic organizer)  CLE 3005.2.6 Deliver effective oral presentations.  CLE 3005.3.2 Employ various prewriting strategies.  CLE 3005.5.2 Analyze text for fact and opinion, cause-effect, inferences, evidence, and conclusions.  CLE 3005.5.3 Evaluate an argument, considering false premises, logical fallacies, and quality of evidence presented.  CLE 3005.5.4 Analyze the logical features of an argument.  Ecology:  Human populations and regulations  CLE 3255.2.1 Cite examples of populations limited by natural factors, humans or both.  CLE 3255.2.2 Explain population growth patterns and rates.  CLE 3255.2.3 Summarize how natural selection influences a population over time. | | | | | | | | | | | | | | | | | | | | | | | | | |
|  | | | | | | | | | | | **T** | **A** | **E** |  | | | | | | | | | **T** | | **A** | | | **E** |
| **Professional (21st Century) Skills** to be taught, assessed and/or encouraged**:** | | | Collaboration | | | | | | | | X | X | X | Other: | | | | | | | | |  | |  | | |  |
| Communication (Oral Presentation) | | | | | | | | X | X | X |  | | | | | | | | |  | |  | | |  |
| Critical Thinking/Problem Solving | | | | | | | | X | X | X |  | | | | | | | | |  | |  | | |  |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Major Products & Performances** | Group: | | | * Group presentations In U.S. history class. Teams of approximately 4 students will prepare a powerpoint presentation to present their analysis results and predictions to a government panel. | | | | | | | | | | | | | | | | **Presentation Audience**   **Presentation Audience:**      Class   School | | | | | | | | |
|  | Class X | | | | | | | |
|  | School X | | | | | | | |
|  | Community | | | | | | | |
| Individual: | | | * Individual paper which presents their analysis results of the challenges brought about by trends in the U.S. population. The paper should include charts that justify their predictions and recommendations. They must identify at least one change that can be modeled by an exponential function. * Individual powerpoint delivered In Ecology which compares population trends in developed and undeveloped countries. | | | | | | | | | | | | | | | |  | Experts X | | | | | | | |
|  | Web | | | | | | | |
|  | Other: | | | | | | | |
| Project Overview page 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Entry Event** to  launch inquiry,  engage students: | | In groups, students perform M&M experiment to measure and graph exponential decay. Discuss the overview of the project and the expectations for the math deliverables.  In U.S. History, students will evaluate the population pyramids of various countries. Discuss the overview of the project and the expectations for the final paper and group presentations. | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Assessments** | | **Formative Assessments**  (During Project) | | | | X | | Quizzes/Tests | | | | | | | |  | | Practice Presentations | | | | | |  | | |
| X | | Journal/Learning Log | | | | | | | |  | | Notes | | | | | |  | | |
|  | | Preliminary Plans/Outlines/Prototypes | | | | | | | |  | | Checklists | | | | | |  | | |
|  | | Rough Drafts | | | | | | | |  | | Concept Maps | | | | | |  | | |
|  | | Online Tests/Exams | | | | | | | |  | | Other: | | | | | |  | | |
| **Summative Assessments**  (End of Project) | | | |  | | Written Product(s), with rubric:  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | | | | | | | |  | | Other Product(s) or Performance(s), with  rubric:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | | | | | |  | | |
| X | | Oral Presentation, with rubric | | | | | | | |  | | Peer Evaluation | | | | | |  | | |
| X | | Multiple Choice/Short Answer Test | | | | | | | |  | | Self-Evaluation | | | | | |  | | |
|  | | Essay Test | | | | | | | |  | | Other: | | | | | |  | | |
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| **Resources Needed** | | **On-site people, facilities:** | | | | | | |  | | | | | | | | | | | | | | | | | | | |
| **Equipment:** | | | | | | | Laptop carts, flash drives to save presentations, M&Ms and baggies, graphing calculators, | | | | | | | | | | | | | | | | | | | |
| **Materials:** | | | | | | |  | | | | | | | | | | | | | | | | | | | |
| **Community resources:** | | | | | | |  | | | | | | | | | | | | | | | | | | | |
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| **Reflection Methods** | | **(Individual, Group, and/or Whole Class)** | | | X | | Journal/Learning Log | | | | | | | |  | | Focus Group | | | | | |  | | |  | | |
| X | | Whole-Class Discussion | | | | | | | |  | | Fishbowl Discussion | | | | | |  | | |  | | |
|  | | Survey | | | | | | | |  | | Other: | | | | | |  | | |  | | |